KEITHLEY

Models 865 and 866 Digital Thermometers

Instruction Manual

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WARRANTY

We warrant each of our products to be free from defects in material and workmanship. Our obligation under this warranty is to repair or replace, at our option, any instrument thereof which, within a year from date of shipment, proves defective upon examination. We will pay local domestic surface freight costs. (NOTE: This warranty does not cover battery replacement or damage due to battery leakage.)

SERVICE POLICY

For service on your instrument, contact your local Keithley representative who will be able to give you immediate assistance in most cases. Complete repair and calibration facilities are maintained in the United States, West Germany, Great Britain, France, the Netherlands, Switzerland, and Austria. Information concerning the application, operation or service of your instrument may be directed to the applications engineer at any of the above locations.

STATEMENT OF CALIBRATION

This instrument has been inspected and tested in accordance with specifications published by Keithley Instruments, Inc. The accuracy and calibration of this instrument are traceable to the National Bureau of Standards through equipment which is calibrated at planned intervals by comparison to certified standards maintained in the Laboratories of Keithley Instruments, Inc.

SPECIFICATIONS

MODEL 865 SPECIFICATIONS

TEMPERATURE SENSOR TYPE: Thermistor (2252 Ohm @ 77°F)

RANGE	TEMPERATURE SPAN	RESOLUTION	ACCURACY* (65° to 82°F; 1 year)
200°F	-40.0° to 199.9°	0.1°	±(0.3% rdg + 0.5°F)
	-70.0° to -40.1°	0.1°	±(0.3% rdg + 1.0°F)
300°F	-70° to 300°	1°	±(0.3% rdg + 1°F)

***ACCURACY:** Includes repeatability, temperature coefficient (65° to 82°F), time stability (1 year), and linearization conformity errors. Excludes probe errors; however probe errors around 32°F may be compensated by an internal adjustment.

REPEATABILITY: 0.2°F typical for 1 week at constant ambient temperature.

TEMPERATURE COEFFICIENT: 65° to 82°F; included in accuracy specification. From 14° to 65° and 82° to 122°F: less than ±(0.06% rdg + 0.01°F)/°F

SENSOR VOLTAGE: 40mV rms maximum.

MODEL 866 SPECIFICATIONS

TEMPERATURE SENSOR TYPE: Thermistor (2252 Ohm @ 25°C)

RANGE	TEMPERATURE SPAN	RESOLUTION	ACCURACY* (18° to 28°C; 1 year)
150°C	-40.0° to 150.0°	0.1°	±(0.3% rdg + 0.3°C)
	-55.0° to -40.1°	0.1°	±(0.3% rdg + 0.6°C)

***ACCURACY:** Includes repeatability, temperature coefficient (18° to 28°C), time stability (1 year), and linearization conformity errors. Excludes probe errors; however probe errors around 0°C may be compensated by an internal adjustment.

REPEATABILITY: 0.1°C typical for 1 week at constant ambient temperature.

TEMPERATURE COEFFICIENT: 18° to 28°C; included in accuracy specification. From -10° to 18° and 28° to 50°C: less than ±(0.06% rdg + 0.01°C)/°C.

SENSOR VOLTAGE: 40mV rms maximum.

MODEL 865 and 866 GENERAL SPECIFICATIONS (unless specified):

DISPLAY: 3½-digit LCD, 13mm (0.5") height. Polarity and decimal point indication.

CONVERSION RATE: 1.5 readings per second.

OPEN SENSOR INDICATION: Display reads between -100° and -199°.

OVERRANGE INDICATION: 3 least significant digits blanked.

MAXIMUM COMMON MODE VOLTAGE: 42V peak to earth.

COMMON MODE REJECTION: Less than 0.01°/volt at DC, 50Hz and 60Hz. (2kΩ unbalance, LO driven)

ENVIRONMENTAL LIMITS FOR OPERATING: -10° to 50°C, (14° to 122°F) less than 80% relative humidity up to 35°C (95°F); linearly derate 3% R.H./°C from 35° to 50°C (1.5% R.H./°F from 95° to 122°F).

ENVIRONMENTAL LIMITS FOR STORAGE: -35° to 60°C (−30° to 140°F), less than 90% relative humidity up to 35°C (95°F); linearly derate 3% R.H./°C from 35° to 60°C (1.5% R.H./°F from 95° to 140°F).
THERMISTOR LINEARIZATION: Ratiometric dual-slope A/D with continuous linearization.
INPUT CONNECTION: ¼" (6mm) Phone Jack.
POWER: 9V alkaline or carbon-zinc (NEDA 1604) battery.
BATTERY LIFE, CONTINUOUS: 350 hours typical with alkaline battery; 200 hours typical with carbon-zinc battery.
BATTERY INDICATOR: Display indicates "LO BAT" when less than 10% of life remains.
DIMENSIONS, WEIGHT: 160mm long × 69mm wide × 31mm thick (6.3" × 2.7" × 1.2"). Net weight 210gm (7.5 oz.)
CONSTRUCTION: Heavy duty ABS plastic housing.
ACCESSORIES SUPPLIED: Battery and instruction manual.
Specifications subject to change without notice.

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GENERAL INFORMATION

The Models 865 and 866 are handheld digital thermometers. Both instruments have large easy to read liquid crystal displays (LCD). The input connection for each instrument consists of a 1/4 inch phone jack. This input accomodates any one of the available accessory thermistor based probes and sensors. The resistance value of the thermistor at 25°C (77°F) is 2252Ω. The instruments are powered by a 9V battery. Continuous operation of 350 hours is typical with an alkaline battery or 200 hours typical with a carbon-zinc battery.

The Model 865 measures temperature from -70° to 300°F on two ranges. The 300°F range measures temperature from -70°F to 300°F with a resolution of 1°F. The accuracy of the 300°F range is ±(0.3% +1°F). The 200°F range measures temperature from -70°F to 199.9°F with a resolution of 0.1°F. The accuracy from -70°F to -40°F is ±(0.3% +1°F) and the accuracy from -40.0°F to 199.9°F is ±(0.3% +0.5°F).

The Model 866 measures temperature from -55° to 150°C on one range with a resolution of 0.1°C. The accuracy from -55°C to -40.1°C is ±(0.3% to 0.6°C). The accuracy from -40.0°C to 150.0°C is ±(0.3% +0.3°C).

MANUAL ADDENDA

Improvements or changes to this manual will be explained on an addendum included with the instrument.

UNPACKING AND INSPECTION

The Models 865 and 866 are inspected both mechanically and electrically before shipment. Upon receiving the instrument unpack all items from the shipping container and check for any obvious damage that may have occurred during transit. Report any damage to the shipping agent. Retain and use the original packing materials if reshipment is necessary. The following items are shipped with all Model 865 or 866 orders:

- Instrument (865 or 866)
- Battery (NEDA 1604)
- Instruction Manual

OPTIONAL ACCESSORIES

Model 8660 Tilt Stand/Belt Clip/Probe Holder for the Model 865 or 866.

Model 8662 Encapsulated Thermistor for general purpose temperature measurements. Accuracy of ±.2°C from 0°C to 70°C. Response time is 6 seconds in stirred liquids. The temperature range is -55°C to 150°C. The probe length is a 6 foot teflon cable.

Model 8663 General Purpose Immersion Probe for temperature measurements of liquids and general purpose applications. The accuracy is ±.2°C from 0°C to 70°C. The temperature range is from -55°C to 150°C. The response time is 3 seconds in stirred liquids.

Model 8663A General Purpose/Immersion Probe—The Model 8663A is a general purpose probe that is inserted directly into the instrument via the ¼" phone jack. This probe has the same specifications as the Model 8663.

Model 8664 Penetration Probe for temperature measurements of soft and semi-frozen solids. The temperature range is -55°C to 150°C. The accuracy is ±.2°C from 0°C to 70°C. The response time is 4 seconds in stirred liquids.

Model 8665 Surface Probe for temperature measurements of flat surfaces of solids. The temperature range is -55°C to 150°C. The accuracy is ±.2°C from 0°C to 70°C. The response time is 5 seconds (brass block).

Model 8666 Air/Gas Probe—Exposed thermistor within a protective shroud responds to ambient temperature. The temperature range is -55°C to 150°C. The accuracy is ±.2°C from 0°C to 70°C. The response time is 5 seconds (5m/sec airflow).

Model 8668 Soft Carrying Case is a padded vinyl carrying case that holds one handheld meter, a Model 8660 and a probe.

PREPARATION FOR USE

The Models 865 and 866 are supplied ready for use. To replace/install the battery refer to the servicing information section. The thermometer is designed to work with any of the probes listed in the optional accessories section.

SAFETY SYMBOLS AND TERMS

The symbol on the instrument denotes that the user should refer to the operating instructions.

The **WARNING** used in this manual explains dangers that could result in personal injury or death.

The **CAUTION** used in this manual explains hazards that could damage the instrument.

OPERATION

Refer to Figures 1 and 2 for Models 865 and 866 control layouts.

ENVIRONMENTAL CONDITIONS

Operation of the Model 865 and 866 should take place at an ambient temperature which is stated in the specifications.

865 Operation

1. Turn power on by selecting the desired range.
   A. 200°F range is the center position of the ON/OFF range switch.
   B. 300°F range is the upper position of the ON/OFF range switch.
2. Select appropriate temperature probe and insert it into the input jack. (Model 8662, 8663, 8663A, 8664, 8665 or 8666).
3. Make the measurement:
   A. Touch the probe tip to the material to be measured.
   B. Read the display. Reading is in degrees Fahrenheit.

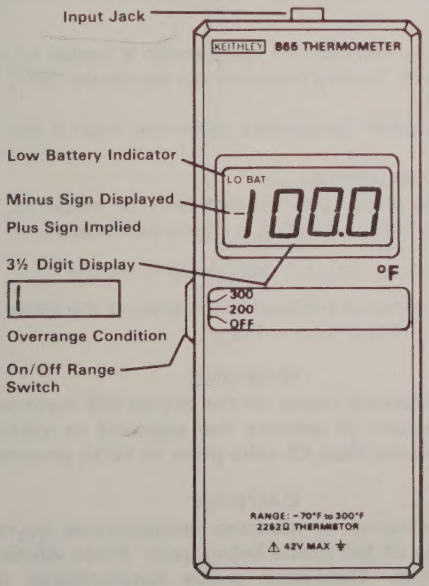


Figure 1. Model 865 Control Layout

NOTE

An open sensor is indicated by a reading on the display of between −100° and −199°.

WARNING

A shock hazard exists on the Model 865 input jack when probes or sensors are exposed to voltage levels greater than 42 volts peak to earth ground.

CAUTION

Do not attempt to measure temperatures beyond the range of the probe being used. Probe damage may occur. Maximum probe temperatures are given in the optional accessories section.

Safety Precautions:

1. Do not touch the probe tip when measuring excessively high or low temperatures.
2. Do not exceed 42 volts peak from the input jack to earth ground.

866 Operation

1. Set power on. The ON/OFF range switch is located on the side of the instrument. Turning power on also selects the 150°C measurement range.
2. Select appropriate temperature probe and insert it into the input jack.
3. Make the measurement:
   A. Touch the probe tip to the material to be measured.
   B. Read the display. Reading is in degrees Celsius.

NOTE

An open sensor is indicated by a reading on the display of between −100.0° and −199.9°.

WARNING

A shock hazard exists on the Model 866 input jack when probes or sensors are exposed to voltage levels greater than 42 volts peak to earth ground.

CAUTION

Do not attempt to measure temperatures beyond the range of the probe being used. Probe damage may occur. Maximum probe temperatures are given in the optional accessories section.

Safety Precautions

1. Do not touch the probe tip when measuring excessively high or low temperatures.
2. Do not exceed 42 volts peak from the input jack to earth ground.

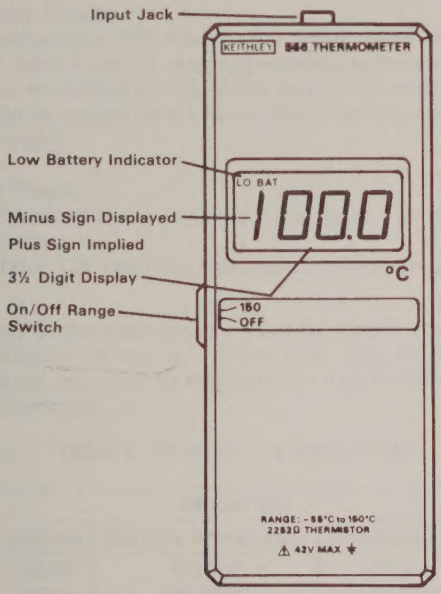


Figure 2. Model 866 Control Layout

SERVICING INFORMATION

VERIFICATION PROCEDURE

Functionality Check

At room temperature hold the tip of a probe sensor between your thumb and index finger. A reading ascending to between 25°C and 40°C should be realized for the Model 866 and a reading of 77°F to 104°F should be realized for the Model 865 to confirm the functionally of the instrument.

Accuracy Check

1. Set up the circuit shown in Figure 3. See Table 3 for recommended test equipment.
2. Follow Table 1 to verify the instrument's performance.

NOTE

The LO of the resistance box must be connected to the LO (sleeve) of the ¼" phone jack. The HI of the resistance box must be connected to the HI (tip) of the ¼" phone jack.

Table 1. Performance Verification

Model 865			
Step	**Setting**	**Decade Resistance**	**Allowable Reading**
1	200°F	75750Ω	-39.4 to -40.6
2	200°F	245,700Ω	-68.8 to -71.2
3	200°F	19220Ω	-00.5 to 00.5
4	200°F	220.8Ω	188.9 to 191.1
5	300°F	43Ω	298 to 302

Model 866			
Step	**Setting**	**Decade Resistance**	**Allowable Reading**
1	150°C	75790Ω	-39.6 to -40.4
2	150°C	217100Ω	-54.2 to -55.8
3	150°C	7355Ω	-00.3 to 00.3
4	150°C	152.8Ω	99.4 to 100.6
5	150°C	41.9Ω	149.2 to 150.7

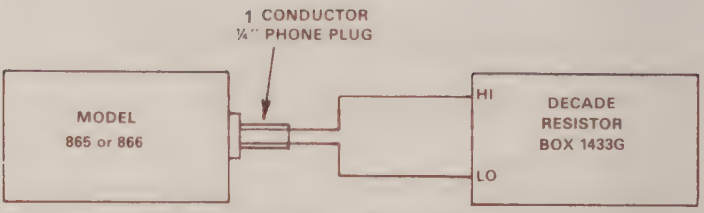


Figure 3. Calibration Set Up

SPECIAL HANDLING OF STATIC SENSITIVE DEVICES

CMOS devices are designed to function at high impedance levels. Normal static charge can destroy these devices. Table 2 lists all static sensitive devices for the Model 865 and 866. Steps 1 through 7 provide instructions on how to avoid damaging these devices.

Table 2. Models 865 and 866 Static Sensitive Devices

Reference Designation	Keithley Part Number
U101, U103	IC-283
U102	LSI-55

1. Devices should be handled and transported in protective containers, antistatic tubes or conductive foam.
2. Use a properly grounded work bench and a grounding wriststrap.
3. Handle device by the body only.
4. Printed Circuit Boards must be grounded to bench while inserting devices.
5. Use antistatic solder suckers.
6. Use grounded tip soldering irons.
7. After devices are soldered or inserted into sockets they are protected and normal handling can resume.

CALIBRATION

Calibration should be performed yearly or whenever the performance verification procedure indicates that the Model 865 or 866 is out of specification.

RECOMMENDED TEST EQUIPMENT

The recommended test equipment for calibration is listed in Table 3. Alternate test equipment may be used. However, the accuracy of the

alternate test equipment must be at least equal to the specifications listed in Table 3.

Table 3. Recommended Test Equipment

Item	Description	Specification	MFR.	Model
A	Decade Resistance Box	Max 1,111,111Ω .01% .1Ω resolution	Gen Rad	1433G

ENVIRONMENTAL CONDITIONS

Calibration should be performed under laboratory conditions having an ambient temperature of 23°C ±3°C and a relative humidity of less than 80%.

CALIBRATION PROCEDURE

Use the following procedure to calibrate the Model 865 or Model 866. To locate the adjustment points, remove the bottom cover and refer to the shield or refer to Figure 5.

WARNING

To prevent a shock hazard, turn the instrument off and remove the input probe from the instrument before removing the bottom cover.

1. Turn the Model 865 or Model 866 on.
2. Connect the decade resistance box to the Model 865 or Model 866. Refer to Figure 3. Refer to Table 4 for Model 865 calibration. Refer to Table 5 for Model 866 calibration.
3. The calibration procedure is now complete. To verify correct calibration refer to the performance verification procedure.

Table 4. Model 865 Calibration

Step	Range	Input	Adjustment	Reading
A	200°F	19220Ω	R111	00.0 ± 0 counts
B	200°F	220.8Ω	R110	190.0 ± 1/2 counts
C	300°F	43Ω	R112	300 ± 0 counts
D	R110 and R112 are interactive. Repeat steps B and C until the results are repeatable.			

Table 5. Model 866 Calibration

Step	Range	Input	Adjustment	Reading
A	150°C	7355Ω	R111	00.0 ± 0 counts
B	150°C	152.8Ω	R110	100.0 ± 1/2 counts
C	150°C	41.9Ω	R112	150.0 ± 0 counts
D	R110 and R112 are interactive. Repeat steps B and C until the results are repeatable.			

DISASSEMBLY INSTRUCTIONS

WARNING

Turn the instrument off and disconnect the temperature probe before removing the bottom cover.

NOTE

When disassembling the instrument handle the PC board by the edges. Body oil, dirt, etc can degrade the circuits performance. Keep the PC board clean and free of contaminants.

1. Place the unit face down on a bench or other similar surface and remove the screws from the bottom cover (865-311).
2. Separate the bottom cover from the rest of the instrument by grasping the top of the case (above the display) and gently lifting it away from the bottom cover.
3. Remove the battery.
4. Remove the standoff (ST-166-1) that secures the PC board to the case. (It is located in the center of the PC board.)
5. Remove the switch cover (866-304 for the Model 866 and 865-310 for the Model 865).
6. Lift the PC board out of the top cover (front panel).
7. Remove the shield.
8. The LCD is held in place on the PC board by a shock resistant mounting and is assembled as shown in Figure 4.
9. To reassemble the unit, reverse the above procedure.

CAUTION

When removing the LCD from the PC board be careful not to spread the four retaining hooks on the clear plastic bezel too far. Plastic bezel hooks may fracture.

WARNING

When reassembling the instrument, be sure to reinstall the switch cover. Common mode voltage may be present on the switch creating a possible hazard if the cover is not resinstalled.

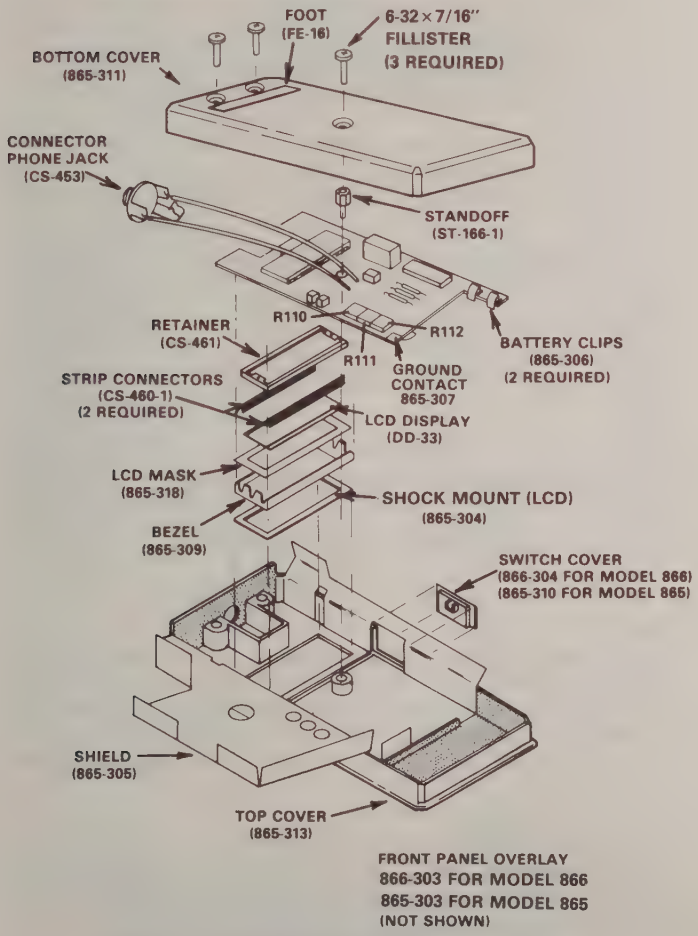


Figure 4. Models 865 and 866 Exploded View

BATTERY INSTALLATION/REPLACEMENT

To install/replace the battery:

1. Remove the bottom cover of the instrument (refer to the disassembly instructions.)

WARNING

Turn the instrument off and disconnect the input probe before removing the bottom cover. Reinstall the cover before resuming use of the instrument.

2. Place the battery in the battery compartment. Observe proper polarity see (Figure 5).
3. Reinstall the bottom cover before resuming use of the instrument.

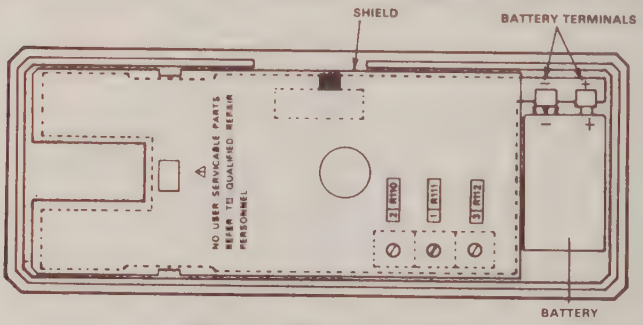


Figure 5. Battery Installation

THEORY OF OPERATION

Sensor

The temperature sensor used is a thermistor. The thermistor sensor is a negative temperature coefficient device. This means that as the temperature increases the resistance of the thermistor decreases. This relationship is a logarithmic function. The current that flows through the sensor is inversely proportional to the resistance of the sensor (ohms law).

Signal Conditioning

U104B and associated resistors minimize the "on" resistance of the gates of U101A and B. The input signal must be conditioned by the Log-Ratio amplifier before being digitized by the A/D converter. The Log-Ratio amplifer operates on two phases and they are:

1. Signal Phase
2. Zero Phase

Each phase has a duration equal to 1/2 of the backplane period of the A/D converter (U102).

In the signal phase the following transpires (Refer to Figure 6). The source voltage, V_S is connected to the sensor R_T. The current that flows through R_T also flows into the collector of Q101. The output voltage of U104C is charged on capacitor C106. Also, during this phase the input to U104A is grounded and the voltage developed is charged on capacitor C105.

In the zero phase the two charged values of voltage are transferred to other parts of the circuit as depicted by Figure 7. The source voltage, V_S is disconnected from the sensor and connected to a zero reference resistor, R_Z. The current that flows through R_Z also flows into the collector of Q101. The output voltage of U104C during the phase is connected to REF LO on U102 by way of C106 and U103B (Refer to the Schematic Diagram 866-106 or 865-106). The voltage that is applied to the input of U104A and across C111 is the difference of the output voltage of U104C and the voltage that was charged on C106 during the signal phase.

The voltage charged on C105 is now opposing the output of U104A and therefore transferred to C110. This is the voltage digitized by the A/D converter (U102). The fixed reference HI voltage for U102 is provided by current source U105 and its associated resistors. With all these voltages the transfer function for the 3½ digit A/D would be:

$$\text{DISPLAY} = 1000\,\frac{(VIN_{HI}\text{-}VIN_{LO})}{(VREF_{HI}\text{-}VREF_{LO})}$$

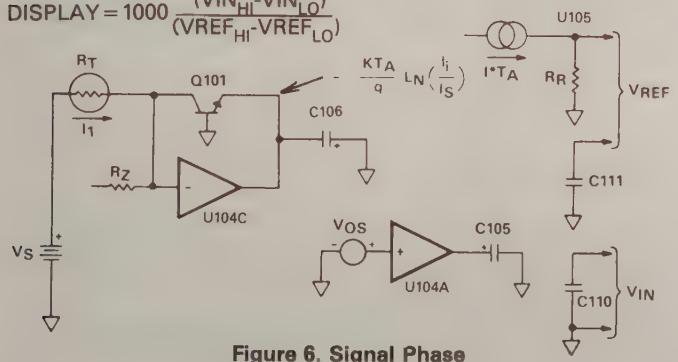


Figure 6. Signal Phase

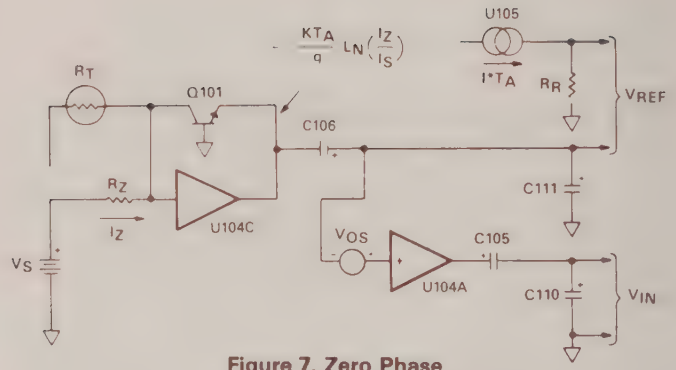


Figure 7. Zero Phase

TROUBLESHOOTING GUIDE

The following troubleshooting information is intended to be used by qualified electronic maintenance personnel who are familiar with the proper use of standard electronic test equipment.

To gain access to the PC board, refer to the disassembly instructions. Use the parts list, schematic diagram and component layout to identify parts and check point locations. This troubleshooting guide is used for both the Models 865 and 866.

DC Voltage Checks

Step	Item/Component	Required Condition	Remarks
1	U102 pin 1 referenced to pin 26	>7.2V	Battery Voltage
2	U102 pin 1 referenced to pin 37	+5V ± 1V	5V Power Supply
3	U102 pin 1 referenced to pin 30	≈3V	

A/D Measurements

To verify A/D and associated circuitry are operating properly measure and record the four voltage points and use the following formula to calculate the display reading. Use the following procedure and a Keithley Model 173A or equivalent:

1. Place a stable input to the instrument under test. For example, 190°F for the Model 865 and 150°C for the Model 866.

2. Measure the voltage at U102 pin 31 (IN HI) and record the value.
3. Measure the voltage at U102 pin 30 (IN LO) and record the value.
4. Measure the voltage at U102 pin 35 (REF LO) and record the value.
5. Measure the voltage at U102 pin 36 (REF HI) and record the value.

NOTE

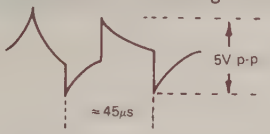
All the measurements in steps 2 through 5 are referenced to analog common.

6. Calculate the display reading using the measured voltages and the following formula; Display Reading (disregarding decimal point) =

$$1000 \times \frac{(\text{Pin 31 voltage}) - (\text{Pin 30 voltage})}{(\text{Pin 36 voltage}) - (\text{Pin 35 voltage})}$$

WAVEFORM CHECKS: (Referenced to Analog Common)

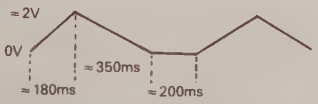
1. U102 pin 40 (OSC 1)



2. U102 pin 39 (OSC 2)

3. U102 pin 38 (OSC 3) (Same as step 2.)

4. U102 pin 27 (INTEGRATOR) (With negative full scale input of approximately 1900 counts.)



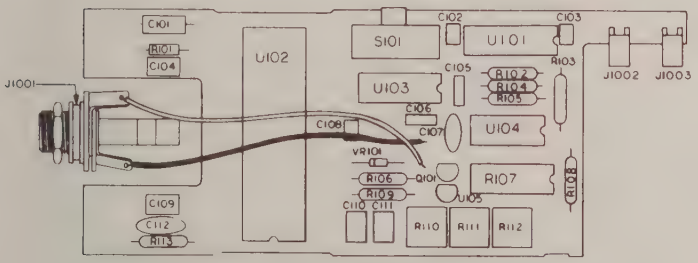
5. U102 pin 21 (Backplane)

Circuit Desig.	Description	Schematic Location	Keithley Part Number
BA101	9V Alkaline Battery, NEDA 1604	F1	BA-14
C101	Capacitor, .047, 50V, Metalized Polypropylene	E2	C-269-.047
C102	Capacitor, .1μF, 50V, Ceramic	F1	C-237-.1
C103	Capacitor, .1μF, 50V, Ceramic	G1	C-237-.1
C104	Capacitor, .33μF, 63V, Metalized Polyester	E2	C-344-.33
C105	Capacitor, .22μF, 63V, Metalized Polyester	D3	C-344-.22
C106	Capacitor, .22μF, 63V, Metalized Polyester	D1	C-344-.22
C107	Capacitor, 1000p, 1000V, Ceramic Disc	C2	C-64-1000p
C108	Capacitor, .1μF, 50V, Ceramic	F1	C-237-.1
C109	Capacitor, .33μF, 63V, Metalized Polyester	E3	C-344-.33
C110	Capacitor, .33μF, 63V, Metalized Polyester	E3	C-344-.33
C111	Capacitor, .33μF, 63V, Metalized Polyester	E1	C-344-.33
C112	Capacitor, 47pF, 500V, Silver Mica or Ceramic	E2	C-320-47p
DS101	3½ digit liquid crystal display	G4	DD-33
J1001	1/4" phone jack	A1	CS-453
J1002	Battery Clip	E1	865-306
J1003	Battery Clip	F1	865-306
Q101	NPN Transistor, MPS8099	C2	TG-157
R101	Resistor, 910k, 5%, 1/4W, Composition	E2	R-76-910k
R102*	Resistor, 5.4k, .1%, 1/8W, Metal Film	D4	R-179-5.4k
R102**	Jumper	—	J101
R103	Factory selected, part of 865-600	B6	R-88-†
R104*	Resistor, 4.6k, .1%, 1/8W, Metal Film	D3	R-179-4.6k
R104**	Resistor, 10k, .1%, 1/8W, Metal Film	D3	R-179-10k
R105*	Resistor, 44k, .1%, 1/8W, Metal Film	D3	R-179-44k
R105**	Resistor, 21.77k, .1%, 1/8W, Metal Film	D3	R-179-21.77k
R106*	Resistor, 16.5k, 1%, 1/8W, Metal Film	C3	R-88-16.5k
R106**	Resistor, 6.34k, 1%, 1/8W, Metal Film	C3	R-88-6.34k
R107	Thick Film Resistor Network	SEV	TF-160
R108	Factory selected, part of 31410	E4	R-88-‡
R109*	Resistor, 3.92k, 1%, 1/8W, Metal Film	F5	R-88-3.92k
R109**	Resistor, 3.65k, 1%, 1/8W, Metal Film	F5	R-88-3.65k
R110	Pot, 200	E4	RP-97-200

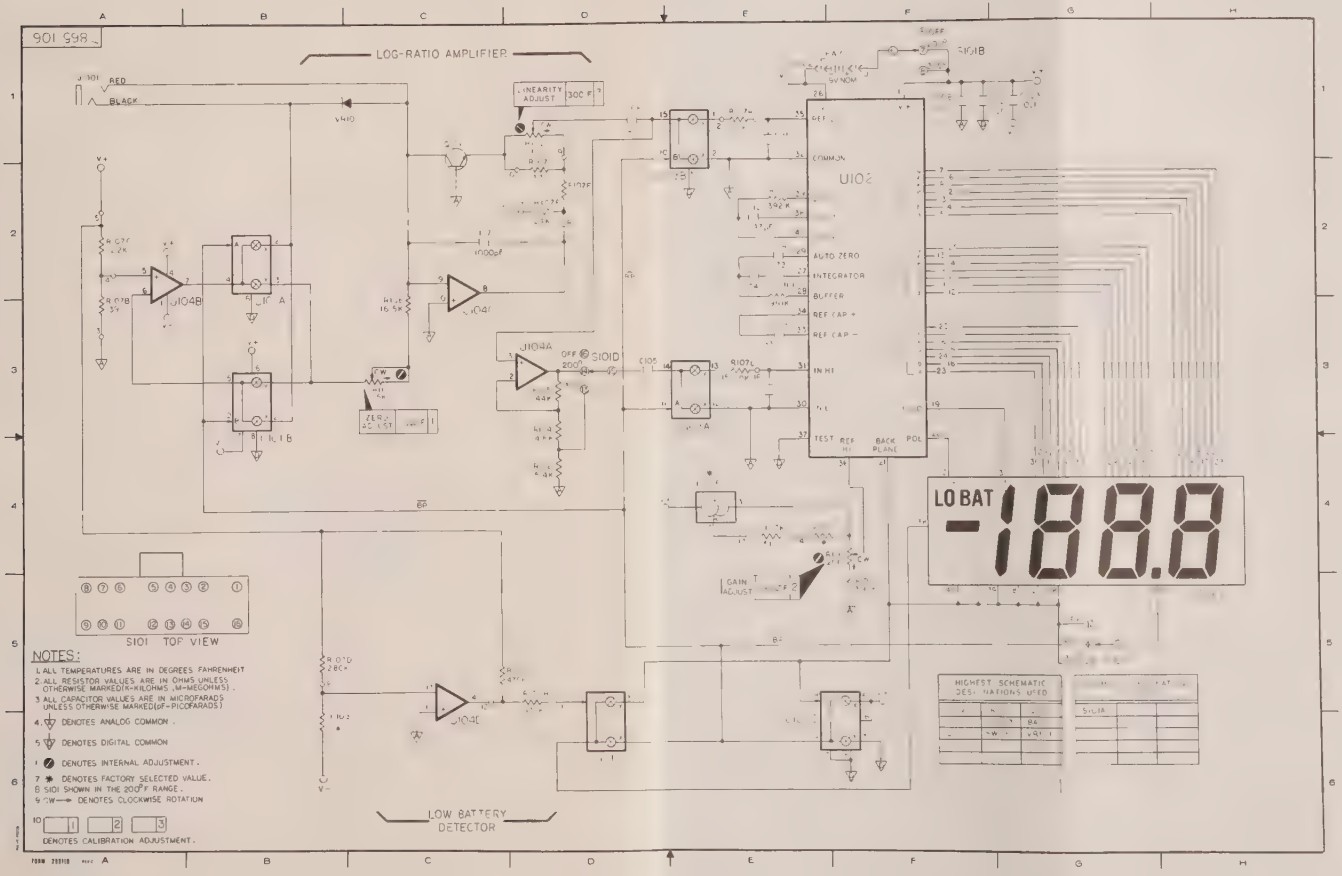
Circuit Desig.	Description	Schematic Location	Keithley Part Number
R111*	Pot, 5k	C3	RP-97-5k
R111**	Pot, 2k	C3	RP-97-2k
R112	Pot, 10Ω	D1	RP-97-10
R113	Resistor, 392k, 1%, 1/8W, Metal Film	E2	R-88-392k
S101	4P3T, Slide Switch	SEV	SW-444
U101	Triple 2 Channel Analog Multiplexer, 4053	SEV	IC-283
U102	3½ Digit Low Power A/D Converter, ICL7136CPL	F2	LSI-55†
U103	Triple 2 Channel Analog Multiplexer, 4053	SEV	IC-283
U104	Quad Low Power J-FET, LF444CN	SEV	IC-329
U105	Current Source, LM334	E4	IC-278‡
VR101	6.2V, Zener Diode, 1N753	C1	DZ-21

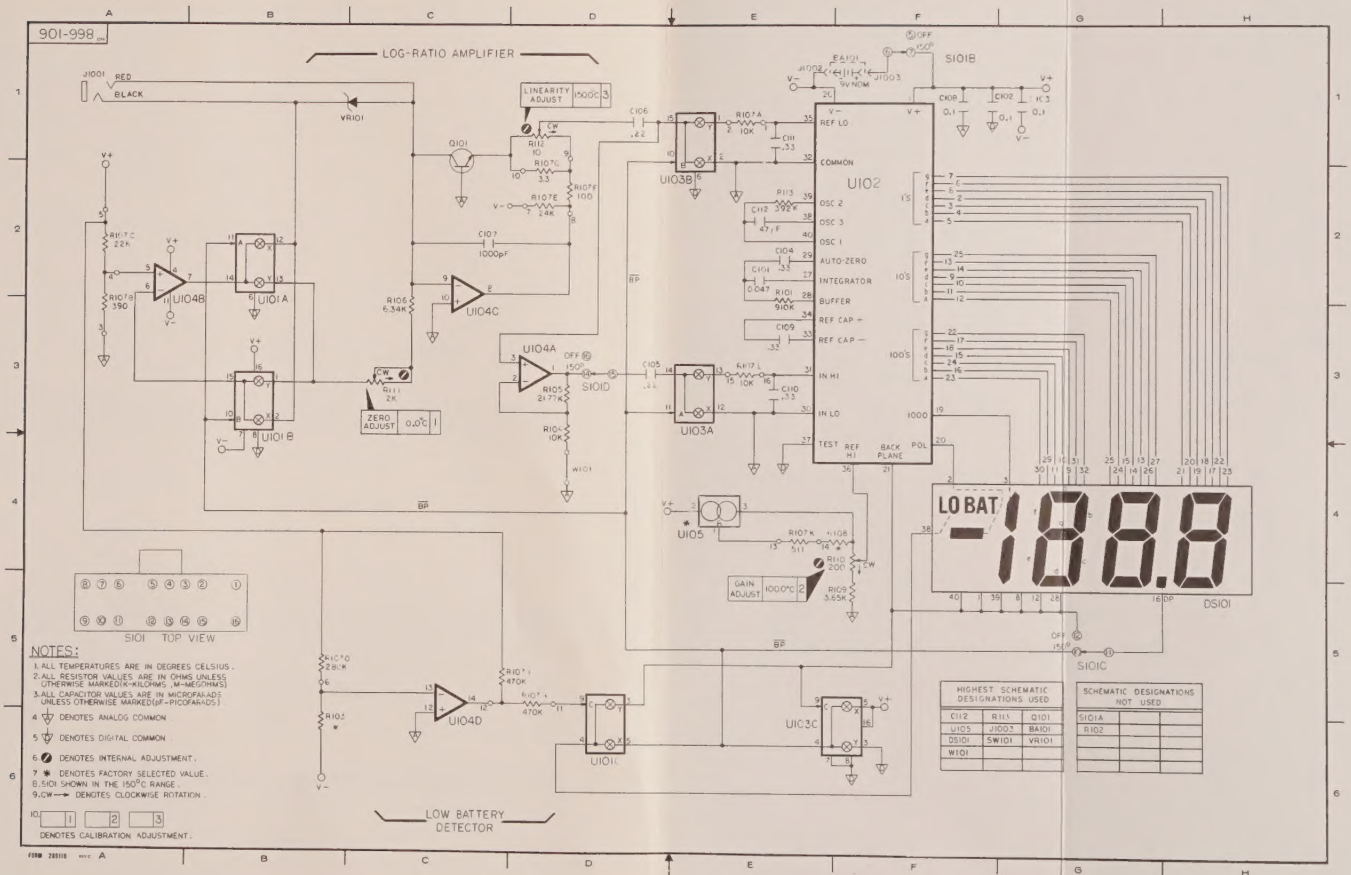
*Model 865
**Model 866
†Part of 865-600
‡Part of 31410

COMPONENT LAYOUT



NOTE
On the Model 866 Component Layout, R102 should be W101.


LOG-RATIO AMPLIFIER
LINEARITY ADJUST
300°F
U102
AUTO ZERO
INTEGRATOR
BUFFER
REF CAP +
REF CAP −
IN HI
IN LO
TEST
BACK PLANE
U104A
U104B
U104C
U104D
S101B
S101A
S101 TOP VIEW
LO BAT
-188.8
GAIN ADJUST
LOW BATTERY DETECTOR
HIGHEST SCHEMATIC DESIGNATIONS USED
NOTES:
1. ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT
2. ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE MARKED (K=KILOHMS, M=MEGOHMS).
3. ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE MARKED (pF=PICOFARADS)
4. DENOTES ANALOG COMMON.
5. DENOTES DIGITAL COMMON
6. DENOTES INTERNAL ADJUSTMENT.
7. * DENOTES FACTORY SELECTED VALUE.
8. S101 SHOWN IN THE 200°F RANGE.
9. CW ⟶ DENOTES CLOCKWISE ROTATION
10. DENOTES CALIBRATION ADJUSTMENT.


901-998
LOG-RATIO AMPLIFIER
LINEARITY ADJUST
ZERO ADJUST
GAIN ADJUST
LOW BATTERY DETECTOR
LO BAT
-188.8
DSI01
SI01 TOP VIEW
SI01A
SI01B
SI01C
SI01D
U101A
U101B
U101C
U101D
U102
U103A
U103B
U103C
U104A
U104B
U104C
U105
NOTES:
1. ALL TEMPERATURES ARE IN DEGREES CELSIUS.
2. ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE MARKED(K-KILOHMS, M-MEGOHMS)
3. ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE MARKED(pF-PICOFARADS)
4. DENOTES ANALOG COMMON
5. DENOTES DIGITAL COMMON
6. DENOTES INTERNAL ADJUSTMENT.
7. * DENOTES FACTORY SELECTED VALUE.
8. SI01 SHOWN IN THE 150°C RANGE.
9. CW DENOTES CLOCKWISE ROTATION.
10. DENOTES CALIBRATION ADJUSTMENT.
HIGHEST SCHEMATIC DESIGNATIONS USED
SCHEMATIC DESIGNATIONS NOT USED

SERVICE FORM

Model No._____ **Serial No.**_____ **P.O. No.**_____ **Date**_____ **R-**_____

Name _____ **Phone**_____

Company _____

Address_____

City_____ **State**_____ **Zip**_____

List all control settings and describe problem. _____

_____

_____

_____ (Attach additional sheets as necessary.)

Show a block diagram of your measurement system including all instruments connected (whether power is turned on or not). Also describe signal source.

Where is the measurement being performed? (factory, controlled laboratory, out-of-doors, etc.)_____

What power line voltage is used?_____ Variation?_____

Frequency?_____ Ambient Temperature?_____°F.

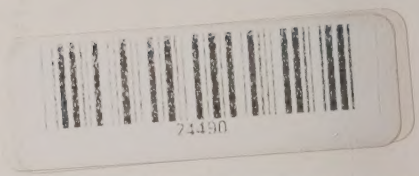
Variation? _____°F. Rel. Humidity? _____ Other? _____

Any additional information. (If special modifications have been made by the user, please describe below.) _____

_____

_____

Please photo copy this form, and
return it with the instrument.



KEITHLEY

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